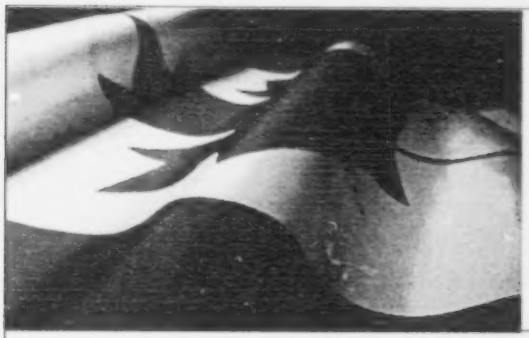

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The Effect of Tuition Fees on Post-secondary Education in Canada in the late 1990s

by

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Abstract

Tuition fees increased rapidly in the 1990s in most Canadian provinces raising concerns about access to post-secondary education. This paper examines the role of tuition fees in explaining participation in college and university programs from 1997 to 1999 in all provinces except Quebec and Ontario. Differentiated responses to tuition fees by family income and grades are explored. Information on participation patterns of high school graduates is derived from the new Youth in Transition Survey. Other datasets provide approximate measures of tuition and of respondents' family earnings. The analysis suggests that PSE choices were not particularly sensitive to either tuition fees at their current levels or to family earnings at the time of enrolment. By contrast, academic preparation and parental education were critical in determining whether students enrolled in PSE and which type of program they chose. These conclusions hold for the whole sample as well as for students from low-income families or with average grades. Three interpretations are possible for the lack of influence of tuition fees: 1) government student loans were able to meet the growing financial needs of most students; 2) the wage premium associated with PSE may have increased sufficiently in the late 1990s to offset the higher tuition fees; and 3) academic rather than financial barriers at the time of enrolment are perhaps what most prevent low-income students from attending PSE programs (e.g. no high school diploma), particularly at the university level.

Résumé

Les frais de scolarité au collège et à l'université ont augmenté substantiellement au cours des années 90 dans la plupart des provinces canadiennes. L'augmentation des frais de scolarité remet en question l'accessibilité aux EPS en général et à l'université en particulier. Cette étude examine le rôle des frais de scolarité dans les décisions de participation au collège et à l'université entre 1997 et 1999 dans toutes les provinces sauf le Québec et l'Ontario. Leur influence est aussi analysée pour des sous-groupes de revenu familial et de moyenne académique. L'information sur la participation aux études postsecondaires des jeunes diplômés du secondaire est extraite de la nouvelle Enquête auprès des jeunes en transition. Les mesures de revenu familial et de frais de scolarité sont tirées de sources additionnelles. L'analyse suggère que les décisions postsecondaires n'étaient pas sensibles aux frais de scolarité à leur niveau actuel ni au revenu familial au moment de l'inscription. L'éducation des parents et la préparation académique constituaient par ailleurs les principaux déterminants de la poursuite d'études postsecondaires et du choix de programme. Les mêmes conclusions s'appliquent à l'ensemble de l'échantillon qu'aux étudiants de familles à faible revenu et à ceux ayant des notes moyennes. Trois interprétations des résultats liés aux frais de scolarité sont possibles : 1) les programmes fédéraux et provinciaux de prêts et bourses pourraient avoir réussi à répondre aux besoins grandissants de financement des étudiants; 2) l'avantage salarial associé à des études postsecondaires pourrait avoir cru suffisamment dans les années 1990 pour compenser la hausse des frais de scolarité; enfin, 3) la barrière empêchant les

étudiants moins favorisés de poursuivre des études postsecondaires, particulièrement à l'université, est possiblement davantage d'ordre académique (ex. pas de diplôme secondaire) que liée à des contraintes financières au moment de l'inscription.

I. Introduction

University tuition fees have soared over the 1990s. Between the fall of 1995 and the fall of 2000, a series of increases have raised tuition fees by 28 per cent in real terms.

While the escalation of university tuition fees has received much media attention, increases in college fees have largely gone unnoticed despite the drastic changes that occurred in some provinces. For example, average college tuition fees in New Brunswick increased by 226 per cent between the fall of 1995 and the fall of 2000, from $736 to $2,400 in constant 2000 dollars. Similarly, college tuition fees have climbed from $1,021 to $2,339 in Alberta over the same period. This situation is potentially problematic given that colleges have traditionally provided a less expensive post-secondary education (PSE) alternative to university.

Despite these increases, Canadian PSE participation has remained roughly constant overall at 30-32 per cent, and so has participation at college and university throughout the 1990s.[1] While this may suggest that access has been unaffected, the composition of university and college student bodies could still have changed markedly according to family income. In fact, constant PSE participation rates could have prevailed even while fewer low-income students enrolled in post-secondary programs if more students from wealthier families – possibly less sensitive to the rising price tag of higher education - had entered such programs.

Since most jobs in the Canadian labour market nowadays require some form of PSE, it is of crucial policy relevance to encourage all youth who wish and have the ability to pursue at the post-secondary level to do so. Interest and academic skills rather than family resources should indeed be the primary determinants of access to PSE. Understanding the influence of tuition fees, family resources, academic ability and their interplay on PSE participation is a crucial step in the promotion of valuable labour market skills.

While the strong positive correlation that exists between parental income and children's postsecondary participation is often interpreted as indicative of financial barriers to PSE, this is not sufficient to conclude to a causal effect of tuition on participation.[2] In the United States, research directly investigating the relationship between tuition and PSE finds mixed evidence.

To our knowledge, only two studies address this question in the Canadian context. Christofides et al (2001) and Corak et al (2003) examine the participation patterns of Canadian youths in post-secondary institutions. Participants are identified in both studies on the basis of attendance in PSE programs, irrespective of the number of PSE years students had completed at the time of the study. Neither study finds any evidence of a significant effect of tuition fees on participation. One could argue, however, that by including individuals who are already engaged in PSE studies, the authors are more likely

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[1] Education in Canada, 1997 and 2000 editions, table 25. College participation stood at 13-15 per cent and university participation at 16 to 17.5 per cent throughout the 1990s. It measures the participation in higher education of all 18-21 year-olds regardless of whether or not they have earned high school credentials.

[2] See for example Canadian News Facts, 2000; University of Alberta, 2000; Clift et al, 1997; Quirke and Davies, 2002.

to arrive at this conclusion given that students closer to obtaining their diploma might be less inclined to withdraw from their program as a result of higher fees.

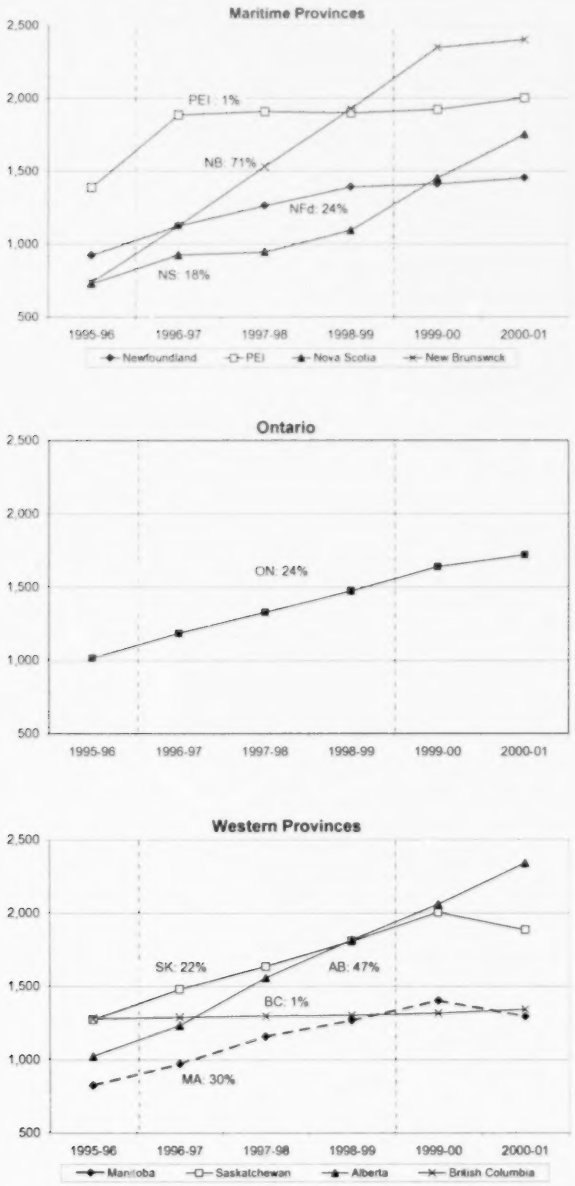
Drawing from these two Canadian studies, we revisit the question of tuition fees and their effect on PSE participation in the late 1990s. Our focus is narrower in that we consider only the – likely more sensitive – decision to enrol in post-secondary studies for the first time. Furthermore, only those individuals who directly enrolled in a PSE program in August or September following their graduation from high school are treated as PSE participants in our study. This allows us to capture the effect that tuition fees might have on some individuals, in forcing them to delay entry and work until they can finance the cost of their PSE studies. We explore the possibility that price (tuition) elasticities may vary according to family resources and to academic ability. To do so, we use a new data set – the Youth in Transition Survey 18 to 20 – to estimate the effect of financial considerations on the decision to participate in PSE while controlling, among other things, for demonstrated academic ability and parental education. Yearly average tuition fees at the provincial level for college and at the Census metropolitan area level for university provide the necessary variation to estimate the parameters of interest.

The paper is organized as follows: the following section outlines recent trends in provincial tuition fees, while section III reviews evidence from the literature on the impact of tuition fees on PSE participation. We then lay out in section IV the econometric framework employed to model the decision to participate in PSE. It further describes the different sources of data used in the analysis. In section V, descriptive statistics serve to illustrate the relationship between fees and participation in Canada before turning to regression results. A discussion of these results concludes in section VII.

II. What happened to tuition fees in the late 1990s?

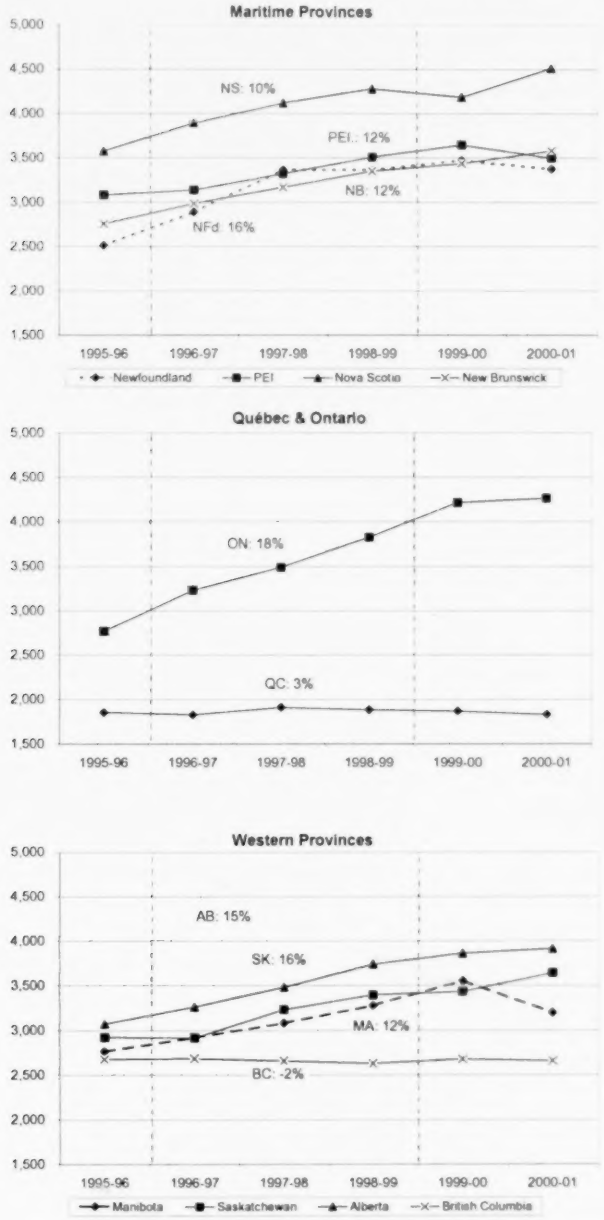
To give a sense of perspective, Figures 1 and 2 show the evolution of average tuition fees in constant 2000 dollars by province over the course of academic years 1995-96 to 2000-01 at the college and university levels, respectively. Since data availability limits the econometric analysis presented below to the 1996-97 to 1998-99 period, we will also limit our discussion of the data to that period. The percentage change in tuition fees between 1996-97 and 1998-99 is indicated next to each province's label in Figures 1 and 2. The sub-period of interest is delimited on these graphs by vertical dotted lines. Note

Figure 1. College Tuition from 1995-96 to 2000-01, Constant 2000 Dollars



Note: The percentage change in tuition fees between 1996-97 and 1998-99 – the period examined in our econometric analysis – is indicated next to each province's label.

Figure 2. University Tuition from 1995-96 to 2000-01, Constant 2000 Dollars



Note: The percentage change in tuition fees between 1996-97 and 1998-99 – the period examined in our econometric analysis – is indicated next to each province's label.

that because college education (CEGEP) remained free of charge in Quebec throughout the period, the province is omitted from Figure 1.[3]

As the figures make apparent, Canadian students faced a considerable amount of variation in tuition fees across provinces and over time. Outside of Quebec, the lowest college tuition fee was found in Nova Scotia in 1996-97 ($925) - Figure 1, top panel - while the highest reached $1,924 in New Brunswick in 1998-99. Average tuition fees increased more rapidly at colleges than at universities (20% vs. 12% during the period under study). A year of university tuition nevertheless remained between 1.7 to 3 times more expensive than a year of college (see Appendix A). University tuition ranged from $1,824 in 1996-97 in Quebec to $4,279 in Nova Scotia in 1998-99 (Appendix A) .

Students in New Brunswick witnessed the most dramatic change in college tuition between 1996-97 and 1998-99: a 71% increase over three years. Meanwhile, both college and university fees remained fairly stable in British Columbia and Quebec over the period, and so did college tuition fees in Prince Edward Island.

This variation over time and across provinces offers a unique opportunity to investigate the effect of tuition on PSE participation particularly given that there were no major institutional changes (such as to the Canada Student Loan Program) during the period of interest.

III. The influence of tuition fees

Research in the US has investigated the relationship between price and participation. Heller (1997) reviews 20 quantitative studies employing a variety of methodological approaches to assess students' sensitivity in the mid-1980s and earlier to changes in the costs of postsecondary education.[4] Costs are measured in these studies as a function of tuition (a "positive" cost) or of financial aid (a "negative" cost), and are calculated for a variety of population subgroups. Despite employing different methodologies, and considering different populations and parameters of costs, most of these studies concur in finding a negative and significant relationship between PSE costs and participation. Specifically, based on Heller's calculations from these papers, every $100 increase in tuition fees reduces participation by 0.5- to 1.0-percentage point. While these estimates appear large, Heller does not include in this range estimates from studies that found no effect of tuition fees. Heller also notes that PSE participation decreases as any form of financial aid is withdrawn, but more so with grant reductions. Moreover, specific groups - low-income students, blacks, and community college goers - appear to be more sensitive to changes in tuition and aid. He concludes by hypothesizing that the impact of tuition fees will be larger for current students who face significantly higher costs than earlier cohorts.

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[3] CEGEPs charge ancillary fees of the order of $200 to $300 per year. Community colleges in the other provinces also have ancillary fees associated with their various programs. To our knowledge, there is no unique information source on ancillary fees in community colleges or CEGEPs, therefore they are not included in our measure of fees.

[4] Heller updates a meta-analysis conducted by Leslie and Brinkman (1987), which surveys empirical evidence on student price responses for the 1970s.

Heller's conjecture about the greater influence of fees on more recent cohorts rests in part on the assumption that the relationship between fees and participation has remained constant over time. It may however be the case, as the following study suggests, that fees no longer affect participation as much as previously. Long (2003) investigates the effects of college costs and quality on the college entrance decisions of high school graduates from 1972, 1982, and 1992 in the U.S. For each potential college candidate, she simulates a number of possible college options. Two measures of costs are employed in this study - tuition and distance from college. Although tuition was an important determinant of attendance for the class of 1972, Long finds that it does not explain the enrolment patterns of the class of 1992. She points out that local labour market conditions were an important predictor for the most recent cohort suggesting that employment prospects outweighed cost considerations in their decision to enrol. Nevertheless, tuition remains an important determinant of the choice *between* colleges, particularly among low-income children. Distance, on the other hand, is negatively and significantly related to the probability of attendance and to the choice of college for all three cohorts.

Although informative, evidence from the American literature is of limited use for the Canadian context due to institutional differences between the two countries. It is indeed difficult to ascertain how the existence of private universities in the US, their more generous financial aid system and tuition fees ranging on a larger interval contribute to the estimates of participation price-sensitivity reported in that literature. Unfortunately, there is very little empirical research to guide policy-makers in Canada. The studies that do exist are more generally concerned with the effect of a variety of family background indicators (Butlin, 1999; Knighton and Mizra 2002). To our knowledge, no study focuses directly on the role of tuition fees on PSE participation although the issue is addressed in the two papers discussed below.[5]

Christofides, Cirello and Hoy (2001) examine the effect of family resources on the PSE participation of Canadian youth. The primary focus of this study is to test whether the remarkable increase in PSE participation among children of low-income families in the 1970s and 1980s is attributable to rising average incomes. The authors define participants as those children aged 18-24 who were enrolled in school during the reference year. Their results highlight the importance of parental income as a determinant of participation but suggest that changes in income over time cannot explain the convergence in participation. Tuition fees are included as a determinant of participation and are found to have little or no influence on PSE attendance. The authors speculate that tuition fees did not vary enough over the period of interest to affect PSE decisions.

Another explanation is that their measure of PSE is imprecise. The dataset they employ does not allow them to identify the type of program attended by 18 to 24 year-olds or their highest degree completed. Hence, individuals registered in non-PSE programs might wrongfully be classified as PSE participants. Additionally, the working sample contains both high school graduates and high school dropt-outs. Finally, all PSE participants

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[5] Dubois (2002) directly analyzes tuition fees as a possible determinant of PSE participation. It is unclear what can be inferred from her results because the measure of tuition fees she uses appears to be ex-post to the participation decision. Tuition fees are those that applied in the school year of 1995-96 whereas the respondents could have enrolled at any time between 1991 and 1995.

contribute equally to the estimates of price elasticity, irrespective of the number of PSE years that they have completed. One could argue that the degree of sensitivity to tuition fees varies considerably across some of these groups. High school dropouts are, for example, unlikely to be affected by tuition fees because they do not even meet the basic entry requirements of PSE institutions. Likewise, there is no reason to believe that PSE tuition fees have any effect on students attending non-PSE institutions. Third-year students – being closer to obtaining their diploma - might be less inclined to withdraw from their program as a result of higher fees than first-year students. It is therefore possible that Christofides et al. find no effect of tuition fees because they cannot distinguish between these different groups.

Corak et al (2003) revisit trends in participation rates using essentially the same dataset[6] as Christofides et al, but excluding youth were attending elementary or secondary schools at the time of the survey and separating college from university participation. By distinguishing college from university participation, they can see whether higher tuition fees gave rise to changes in the composition of overall PSE participation (more college and less university). The focus of their work is to determine whether the recent increase in tuition fees prevented the gap in participation between low- and high-income groups from closing any further. They show that while overall college participation has increased, differences in college participation rates have remained fairly stable and small across income groups from the early 1970s to the late 1990s. Moreover, despite significant increases in tuition fees in the 1990s, the gap in university participation rates between the highest and the lowest income groups continued to lessen. Although these findings could be interpreted to mean that tuition fees have no impact on PSE decisions, the evidence remains inconclusive for policy purposes because tuition fees are not directly included in the analysis.

Our work builds upon these two Canadian studies while attempting to address some of their shortcomings. In accordance with Christofides et al's study, we introduce tuition fees directly as potential determinants of participation. Contrary to these studies, however, we model PSE entrance rather than attendance and characterize individuals that delay entrance as non-PSE goers. Following Corak et al, our analysis is concerned uniquely with the participation decisions of high school graduates and allows for variations in explanatory variables by PSE institution-type. We also refine the measure of tuition fees by distinguishing between the costs of college and of university. Finally, we analyze the tuition response for the whole sample as well as within specific groups usually thought to face greater barriers to access.

IV. To go or not for post-secondary education?

A. Institutional setting

In all provinces except Quebec and Ontario, high school graduates face three options which can be characterized as follows: 1) to forego any further education (momentarily

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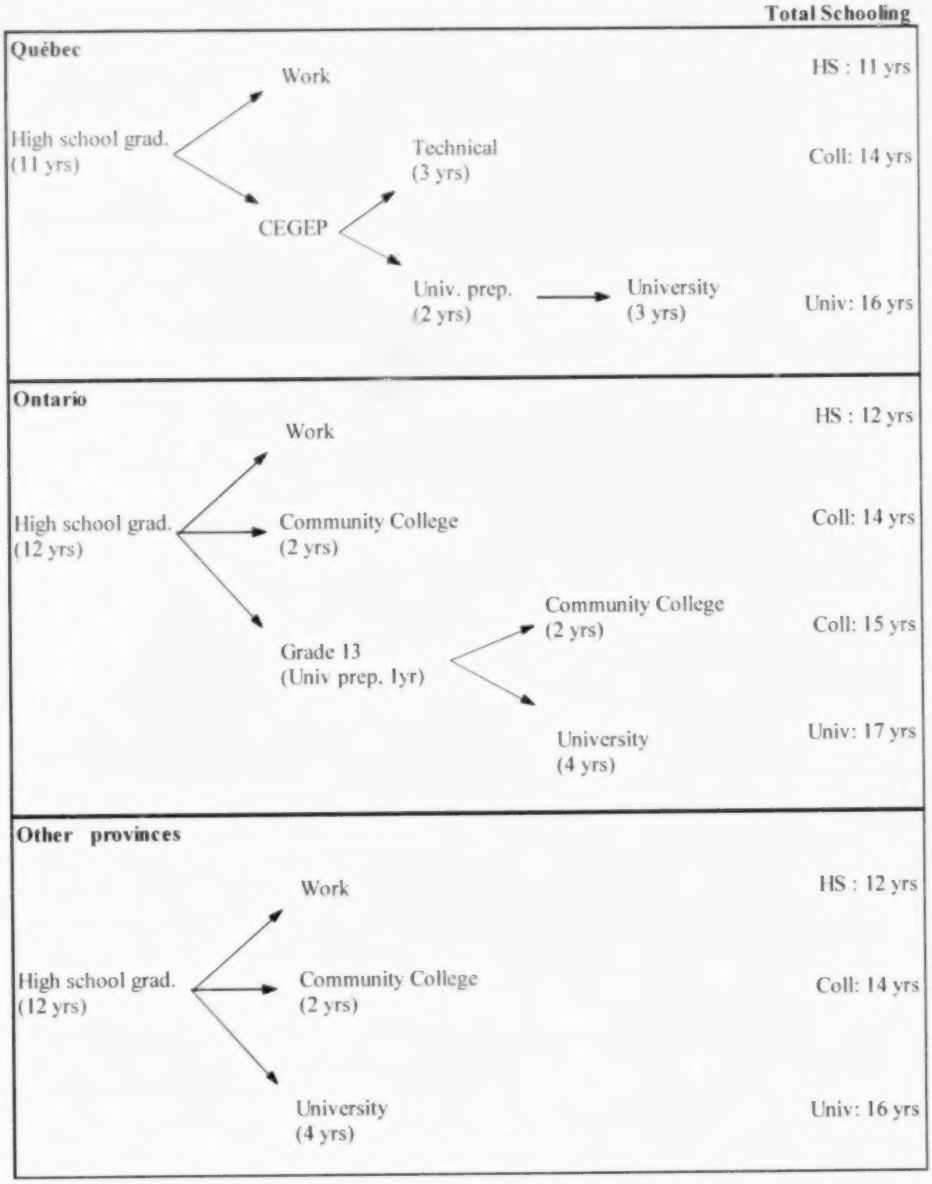
[6] They complement the dataset with information from the Labour Force Survey and compare results using three cycles of the General Social Survey.

or forever) and to start working; or 2) to enter a college program; or 3) to pursue a university degree. In Quebec and Ontario however these three options do not become available at once as is the case elsewhere (see Figure 3).

Figure 3. Provincial Schooling Systems in Canada



In Quebec, university candidates must first undergo a two-year preparatory college program before they can enrol in university. Similarly, while completing a grade 12 meets college requirements in Ontario, a grade 13 is required for a university program.[7] Clearly, university and college tuition fees intervene at different points in time in these two provinces and as compared to the rest of Canada (ROC). To evaluate the relative benefits of college and university education, Quebec and Ontario students need to apply a discount factor. They must also form expectations a few years ahead of time about what university fees are likely to be when they enrol. In contrast, students from other provinces need only to anticipate costs one year prior to enrolling. Thus, in order to describe their decision process, information would be needed regarding their discount factor and expectations about tuition increases. Unfortunately, this information is not readily available.

Furthermore, potential university candidates in Quebec already possess a PSE diploma in the form of a university-preparatory CEGEP certification. This might influence their perceived need for an additional PSE diploma because of the better labour market opportunities they are likely to enjoy over high school graduates. Consequently, CEGEP graduates face a higher opportunity cost to enrol in university than high school graduates from the ROC. Another consideration is that public college education is free in Quebec. This could arguably constitute part of a policy agenda pursued by the Quebec government to bolster PSE participation. In that case, there might be other policy tools used in Quebec to foster participation besides keeping tuition at zero. The inability to observe these, and thus to control for them, most likely would result in tuition wrongly capturing their effect. While using instruments could circumvent this problem, the data set offers no credible candidates for instrumentation.

In addition to the complications that arise because of the different institutional settings discussed above, there are statistical irregularities in the data for Ontario. Indeed, the PSE participation of Ontarian students obtained from YITS appears very much at odds with that of graduates from other provinces and with official statistics reported in Statistics Canada's Education in Canada publication. Post-secondary participation by high school graduates in this province increases by as much as 30 percentage points between 1997 and 1999 whereas the increase is considerably more modest in other provinces and according to administrative data.

The problems posed by these particular institutional features and these statistical irregularities bring us to exclude Ontario and Quebec from our analysis.

B. Empirical Framework

A high school graduate chooses the option among work, college or university that maximizes his utility subject to the associated costs. As researchers, we do not observe all factors affecting this decision, but we can make probabilistic statements about the decision on the basis of observable characteristics. The probability that individual *i* chooses option *j* over the other options can be written as

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[7] Starting in 1999, a new curriculum was introduced in Ontario whereby the grade 13 was abolished. The first cohort completing this new program was ready to enter university or college in the fall of 2003.

$$P_i^j = \Pr(V^j(Z_i, \beta) + \varepsilon_i^j \succ V^k(Z_i, \beta) + \varepsilon_i^k), \qquad \text{where } j \neq k,$$

where Z_i represents a vector of observable determinants of the utility function (V), the weights on these explanatory factors are estimated as β, and the unknown characteristics are captured in ε_i.

The decision process can be modeled either as one where the graduate first chooses whether to attend PSE and then which type of institution to attend (two-step decision) or one in which the student concurrently decides on attendance and institution type (simultaneous decision). These two representations are employed for empirical reasons that will become apparent below.

To estimate the process as a two-step decision, we use two linear probability models (LPM). The LPM estimation procedure has the advantage of producing estimates that are easy to interpret. It also makes it easy to test the robustness of the results to a variety of specifications. The first LPM gives an indication of whether the minimum cost to access PSE – college tuition (T^C) – discourages PSE participation in general:

$$P_i(PSE = 1) = \alpha + \phi Z_i + \lambda T_i^C + \varepsilon_i.$$

It cannot obviously identify whether the impact is greatest on college- or university-bound students because these two groups are pooled. The second LPM assesses the impact of the relative cost of university (T^U-T^C) on the program choice of PSE goers with other determinants Z_i remaining the same as in the first LPM:

$$P_i(Univ = 1 \mid PSE = 1) = \delta + \gamma Z_i + \varphi(T_i^U - T_i^C) + \mu_i.$$

Unfortunately, the LPM technique produces predicted probabilities that are not necessarily bounded between zero and one.[8]

The simultaneous decision model cannot be treated with an LPM because the later, by design, allows only for binary responses whereas three options need to be evaluated concurrently. This representation is estimated by a conditional logit. The probability of choosing option j (e.g. college) depends on an individual's characteristics, the characteristics of this option (e.g. college tuition) and the characteristics of the other options available (e.g. university tuition and cost of work, which is set equal to zero). Letting W represent work, C college and U university, the simultaneous decision model can be expressed as a function of the individual- and choice-specific characteristics Z_i^j and of tuition:

$$P_i(Choice\ j = 1) = \frac{\exp(\beta Z_i^j + \sigma T_i^j)}{\exp(\beta Z_i^W) + \exp(\beta Z_i^C + \sigma T_i^C) + \exp(\beta Z_i^U + \sigma T_i^U)},$$

$$\text{where } j = \{W, C, U\}.$$

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[8] Computing the percentage of predictions outside the zero-one range can assess the extent of the problem. Another common problem of LPM, which can be dealt with by using population weights, is that of heteroscedasticity. All estimates reported here were generated using survey weights.

The conditional logit coefficients are not directly interpretable because estimated parameters appear both in the nominator and in the denominator. In order to infer the importance of the estimated parameters, marginal effects need to be calculated. Computing marginal effects allows for the assessment of the impact of tuition – either college or university – on the probability of working, attending college or university. One drawback of this approach, however, is the independence of the irrelevant alternatives assumption (IIA). The latter supposes that all options constitute real alternatives to one another such that individuals are not indifferent between them. The classical example of this problem is introducing "red buses" as an alternative to "blue buses". For the purpose of this paper, the college and university options are arguably to some degree substitutes. If the IIA does not hold – college and university are perfect substitutes – the conditional logit produces inconsistent estimates.

The LPM and conditional logit procedures present different advantages and offer slightly different insights on the issues of participation. We use both to garner a broader perspective on the question and verify that our results hold irrespective of the estimation technique. Given the flexibility of LPM, this is the strategy we employ to explore the effect of tuition with various specifications. Once we have established our preferred specification, we use the same determinants in the conditional logit estimation.

The analysis is then carried out on the whole sample as well as for sub-groups likely to be more price-sensitive: low-earnings and average-marks students. Students from low-earnings families are more susceptible to face financial barriers and therefore to react more strongly to tuition changes. Students with average grades (sufficient to be admitted but not excellent) might be marginally less interested in pursuing a PSE and more easily deterred by cost considerations if grades are an indication of motivation.

The individual characteristics that we include as determinants of participation and of the choice of program are: gender, mother tongue, grade point average, having taken a university-preparatory mathematics course in high school and the proportion of friends planning to attend PSE. The following family background variables are also included: education of mother and father, family earnings, number of siblings and dummies for missing parental information. Finally, tuition, wage premiums, a year effect and regional differences are controlled for.

C. Data Sources

Information on PSE participation is derived from Statistics Canada's new Youth in Transition Survey 2000 (YITS). Respondents were individuals aged 18 to 20 during the reference year of 1999. YITS is particularly interesting for the purposes of this study not only because its target population is composed of young individuals of PSE decision-making ages but also because the survey collects a wealth of information regarding the respondents' high school experience, scholastic ability and parents' education and background.

Unfortunately however, YITS does not collect any information with respect to family income or wealth, as young respondents typically do not accurately answer questions pertaining to such matters. Instead, data on parental occupations – which are thought to

be more accurate – are gathered. We use these, along with information from the 2001 Canadian Census summary earnings tables[9] to estimate the family earnings of YITS respondents. More specifically, we match the Census average sex-, province-, and 4-digit occupation-specific earnings of individuals aged 45-54 to the parental characteristics of YITS respondents. Of all age groups for which average earnings are reported in the Census tables, we chose to use data on the 45-54 year-olds as this appeared to be the most likely age group for parents of 18 to 21 year old children. Where a parent is said to be working but no occupation is listed in YITS, a value corresponding to the province- and gender-specific average earnings is attributed. The same imputation rule is employed when a parent's occupation is known but the corresponding earnings figure is suppressed from the Census tables because of a low cell count (as is the case, for example, for the "conference and event planners" occupational category in PEI). Imputed parental earnings figures are then used to calculate total family earnings. YITS collects information on up to 4 parents or guardians. For the purposes of the analysis however, the sum of family earnings is computed for the first two parents only.[10]

Likewise, there is no information in YITS relative to tuition fees. Statistics Canada's Tuition and Living Accommodation Costs Survey[11] provides the value of tuition fees from 1996-97 to 1998-99 at 64 Canadian university degree-granting institutions. For each institution, the reported fee corresponds to the average computed across 11 faculties[12] and weighted by enrolment. Provincial college tuition fees, on the other hand, are obtained from an informal telephone survey conducted on an annual basis by the Manitoba Council on Post-Secondary Education with provincial Ministries of Education. Both tuition series are rebased in constant 2000 dollars. Yearly averages (calculated at the provincial level in the case of colleges, and at the Census Metropolitan Area (CMA) level in the case of universities) are matched onto the YITS dataset on the basis of the respondent's last year of high school in his province of residence.

While college establishments can be found in all but the most remote areas, universities are generally located in urban centres. Respondents living in rural settings who wish to attend a university program will therefore need to incur, in addition to tuition fees, the cost of relocating. In an attempt to capture this additional cost, a dummy variable is constructed based on the respondent's location of residence at the time when the YITS sample was drawn. The indicator reflects whether or not the respondent resided within a CMA – where 90 per cent of university students are to be found. Obviously, it would have been preferable to directly measure the additional costs involved but, failing that, this measure should constitute a reasonable proxy.

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[9] Census, Statistics Canada, Cat. No. 97F0019XCB01003.

[10] As part of the survey, respondents are asked which parents they lived with during most of their high school year. If they were away at that time, the question becomes who were the parents or guardians of their family home. We choose to use information on only the first two parents because very few respondents report more than two parents and, those who do, generally report grandparents or step-parents as third and fourth guardians. It is unclear to us which role these additional guardians exert on the respondents' educational outcomes; e.g. do grandparents contribute additional financial resources to the household or are they a financial burden?

[11] Tuition and Living Accommodation Costs Survey, Statistics Canada, Cat. No. 81C0049

[12] Faculties included are Agriculture, Architecture, Commerce, Dentistry, Education, Engineering, Household Sciences, Law, Medicine, Music, and Science.

Finally, in order to account for the net economic benefits of pursuing an education beyond high school, information drawn from the 2001 Census on gender-, Census Metropolitan Area- and education-specific average wages ($2,000) of individuals aged 35 to 44 is added to the dataset. We take the difference between the average earnings of a college graduate (or university graduate) and of a high school graduate. This constitutes our measure of wage premium.

The measure of tuition employed varies according to the model estimated and, in the case of the two-step decision model, also with the step being estimated. The first step of this model employs college fees as the measure of tuition to account for the minimum cost of attending a post-secondary institution. For the second step where the choice is between PSE alternatives, "tuition fees" is a relative measure computed as the difference between the fees charged by universities and colleges (e.g. a $100 increase in college fees translates into a $100 decrease in the relative cost of university).

In the simultaneous decision model, tuition enters in an option-specific manner where the cost of not pursuing at the PSE level is set to zero, that of attending college is equal to the average college tuition in the respondent's province, and that of enrolling in a university program is equal to the average university tuition in one's CMA or province of residence.

D. Working Sample

The working sample is restricted to high school graduates. Doing so minimizes the risk of wrongly attributing to tuition fees the non-participation of individuals who in fact do not meet the entry requirements of post-secondary institutions. Recall also that Ontario and Quebec respondents are eliminated from the sample.

In order to fully exploit the variation over time in tuition fees, we use data on the graduating cohorts of June 97, 98 and 99. We choose to define PSE participants as those who have enrolled in an "admissible" PSE program (see below) within 2 to 3 months of leaving high school because the great majority of programs start at these dates. That is only those that directly enrolled in August or September following their graduation are considered as participants in the analysis. Delayers – those who eventually go but not directly after finishing high school – are characterized as non-goers.[13] The advantage of doing so is that it accounts more broadly for the effect of fees if one response to high fees is postponing entry to work and save for PSE.

We use a stricter definition of PSE programs than the one employed by Statistics Canada. Programs must be at least 8 months in length and offered by a public institution (university, university college, community college or a technical/trade school) to satisfy our definition. Individuals that attended programs of less than 8 months at public college or university establishments as well as those enrolled in private PSE institutions[14] are classified as non-participants in order, again, to restrain the analysis to participants in traditional PSE programs.

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[13] Some 18 per cent of the individuals observed to pursue at the post-secondary level delay entry by more than a year while only 6 per cent delay until the following academic year. The question of who delays entry into PS programs and why is interesting in its own right. We leave it to be addressed by future research.

[14] This encompasses private business schools and private training institutes such as Career Canada College.

Table 1 below illustrates the makeup of the final working sample. Of the 7,602 individuals that remain from the initial sample, roughly 46 per cent are post-secondary participants. Forty-eight per cent of respondents are men, 10 per cent have a mother tongue other than French or English, 42 per cent had an overall grade point average equal or superior to 80 per cent in their last year of high school, and 78 per cent had taken university preparatory math level classes in high school. The average value of family earnings is $54,400 and parents' highest level of education typically consists of 13 years of education or roughly more than a high school diploma. In terms of PSE costs, respondents in our sample face a fee of $1,380 a year on average to attend college and of $3,280 to attend university. About half the respondents come from a non-Census Metropolitan Area and would therefore have to incur some form of relocation cost if they were to enrol in a university program.

Table 1. Characteristics of High School Graduates in the Working Sample

		Sub-Groups		
	Full Sample	Non-PSE	College	University
PSE Participation	46%		11%	35%
Personal Characteristics:				
Male	48%	52%	44%	43%
Mother Tongue not French or English	10%	8%	11%	13%
High School GPA				
Lower than 70%	19%	28%	14%	5%
70 to 79% *	39%	45%	50%	28%
80% or Higher	42%	27%	36%	67%
University Preparatory Math	78%	67%	80%	95%
Friends Planning to Go to PSE (%)				
None	26%	33%	20%	18%
Some *	48%	47%	48%	49%
All	26%	20%	32%	33%
Parents' Characteristics:				
Family Earnings (2000 Constant $)	54,400	51,300	55,300	58,900
Mother's Education (average years)	12.9	12.5	13.0	13.6
High School diploma or less *	55%	64%	51%	41%
College Educated	23%	21%	26%	26%
University Educated	22%	15%	23%	33%
Father's Education (average years)	12.8	12.3	13.0	13.6
High School diploma or less *	57%	64%	43%	44%
College Educated	19%	19%	34%	19%
University Educated	24%	17%	23%	37%
Tuition: (2000 Constant $)				
College Tuition	1,380	1,390	1,380	1,360
University Tuition	3,280	3,270	3,280	3,200
Lives in non-Metropolitan Area	50%	51%	55%	48%
No. of Observations	7,602	4,028	904	2670

Note 1: Quebec and Ontario students are excluded from the sample.

Note 2: Tuition figures are rounded to the closest $10 and family earnings to the closest $100.

* All the starred categories are the omitted (default) group for categorical variables in the econometric analysis.

Splitting the sample into three groups – non-participants, college goers and university goers - reveals that PSE participants more often tend to be women, have better grades, and have taken university preparatory math courses in high school. In addition, respondents whose mother tongue is neither French nor English are over-represented in PSE sub-groups. PSE goers as a group also come in greater proportion from families with higher earnings and somewhat more parental education, but face similar tuition fees. Moreover, university students tend to have a better academic ability and better grades than do those attending college. Overall, in fact, the most striking difference among the three groups is found along the lines of scholastic ability, that is grades and university-preparatory mathematics courses.

V. Tuition fees: a barrier or barely influential?

A. Trends

As shown in Figures 1 and 2, the cost of attending a PSE program has risen substantially over the period of interest. Did PSE participation decline overall as a result of this? Figure 4 shows the evolution of college and university participation rates within the sample from 1997 to 1999 with the average fee charged by each institution type in the corresponding years indicated over each bar.[15] On average, college participation appears to have remained stable at about 11% over the period despite a $300 increase in tuition at colleges during these three years. Even though university participation dipped in 1998, overall, it increased by 3 percentage points (a statistically significant increase at the 10% level) over the three years while tuition rose by about $230 during that period. Neither series therefore tends to indicate that increases in tuition resulted in lower participation rates. This observation is, however, based on aggregate national-level data. It may hide the true nature of the relationship between participation and tuition existing at lower levels of aggregation. As is apparent in Figure 5, disaggregating the data at the provincial level nevertheless fails to reveal any more evidence than at the national level of a negative relationship linking tuition fees and college or university participation.[16]

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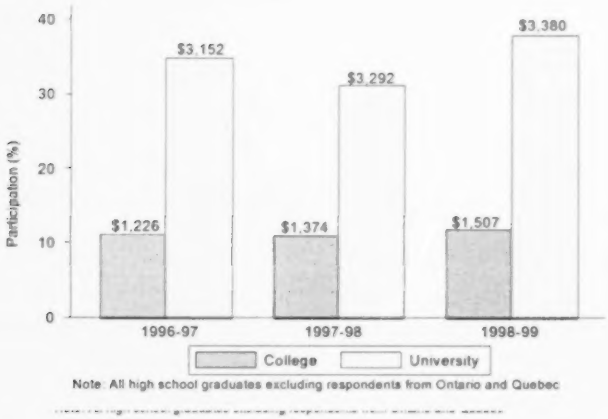
[15] By calculating participation rates and average tuition over our sample, we obtain figures that differ slightly from numbers presented in Figures 1 and 2 for tuition. The change in tuition between 1997 and 1999 amounts to $293 and $263 for college and university respectively according to the administrative date employed in Figures 1 and 2 while the change in college fees was $281 over the same period in our sample and of $228 for universities in the sample. Finally, recall that participation is defined as direct transitions. Thus, these participation rates represent first-time registration in college and university programs right after high school completion.

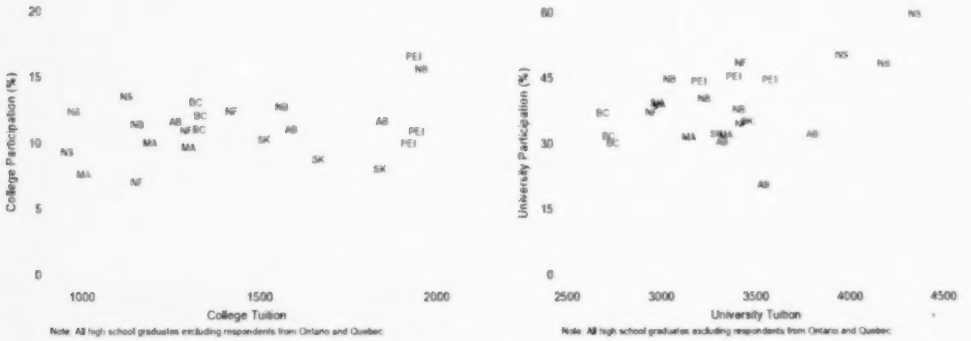
[16] Furthermore, a simple correlation reveals that despite having the lowest university tuition of all Canadian provinces, university participation in Quebec is similar to what is found in other Canadian provinces where tuition fees are much higher.

Figure 4. Participation* and Tuition, 1996-97 to 1998-99



Participation is defined as direct transitions from high school to admissible PSE programs.

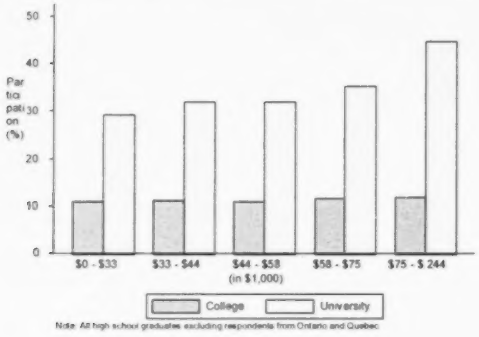
Figure 5. Provincial Participation* and Tuition, 1996-97 to 1998-99



* Participation is defined as direct transitions from high school to admissible PSE programs.

Of course, a number of confounding factors are likely to blur the correlation between fees and participation. Among them is the amount of family resources upon which a prospective student can draw to cover the cost of additional schooling. Figure 6, which illustrates participation rates as a function of family earnings, indicates that family resources do matter for university participation but not at all for college participation. Indeed, while college participation rates are roughly constant across family earnings quintiles, university participation is 15 percentage points higher among the top family earnings quintile than within the bottom one. Most of the gap emerges between the fourth and the fifth quintiles suggesting that it is the behaviour of the fifth quintile rather than that of the first one that is atypical.

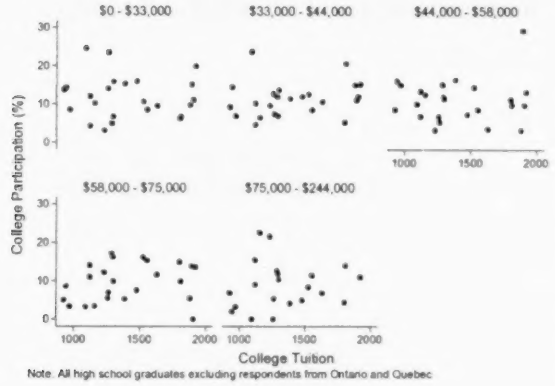
Figure 6. Participation* by Family Earnings Quintiles, 1996-97 to 1998-99

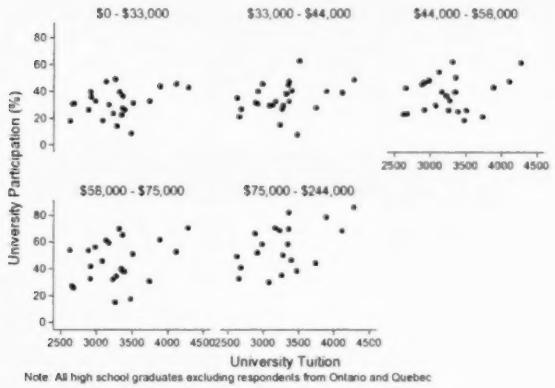


* Participation is defined as direct transitions from high school to admissible PSE programs.

Does controlling for family earnings therefore reveal a more obvious relationship between tuition fees and participation? If the claim is true that tuition fee hikes have jeopardized access to PSE, particularly for low-income individuals, one would expect to see a strong negative relationship between tuition and participation among lower-income quintiles and a much weaker one (if any) within the top quintiles. Moreover, according to Figure 6, if such a pattern did exist it should be particularly obvious at the university level. In Figure 7, where college and university participation is graphed against tuition fees separately by family earnings quintiles, there nonetheless seems to be no indication of a stronger relationship between participation and fees in the lowest family earnings group whether at the college or university level. Instead, university participation appears to increase with tuition in the fourth and fifth quintiles. An explanation offered in the literature about the American situation is that high-income individuals associate higher tuition to higher quality education and therefore are willing to pay more.

Figure 7. Participation* and Tuition Fees by Family Earnings Quintiles, 1996-97 to 1998-99





* Participation is defined as direct transitions from high school to admissible PSE programs.

VI. Regression analysis

A. General results on tuition and family earnings

In order to account for yet more confounding factors in the decision to pursue or not at the post-secondary level, the remainder of the study is conducted using regression analysis.

Table 2 reports the marginal effects[17] of interest from four different specifications. The first three specifications use the two-step decision model estimated by LPM where the first step consists in deciding whether to pursue PSE studies (columns labelled "PSE" in Table 2) and the second pertains to the choice of PSE program (columns labelled "University"). The fourth specification corresponds to the simultaneous decision model for which the option-specific (college and university) marginal effects are reported.

The first specification is a "pared down" regression controlling only for tuition fees, non-CMA residence, family earnings and parental education. Specification 2 adds controls for demonstrated academic ability while specification 3 uses the "full" set of regressors including a time trend and measures of opportunity cost. Finally, the fourth specification estimates the simultaneous decision model by conditional logit using the full set of regressors. Marginal effects are reported only for the variables of interest in this table (the entire set of coefficients for specifications 3 and 4 can be found in Appendix B).

Looking across all four specifications, it appears that tuition fees (first row of the table) have a negative and significant effect on the probability of enrolling in a PSE program in only the first and most basic of specifications. Once controls for high school GPA are added tuition fees are no longer significant. Moreover, nowhere does the second decision – the choice of program – appear to be affected by tuition fees.

Specifications 3 and 4 include controls for individual and family characteristics, for the wage premium associated with possessing a college or university degree, and provincial dummies to control for other differences in participation. To verify that the results on the tuition fees were not sensitive to the use of provincial dummies, specification 3 was run with regional dummies (Maritimes, Prairies and British Columbia). The coefficients on tuition fees remain non-significant. Furthermore, a variety of non-linear functional forms (quadratic, step-function) were tested to ensure that the result with respect to fees was not due to a poor fit of the data. Once again, tuition remained non-significant, providing some evidence that the result is robust to different functional forms and specifications.

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[17] Marginal effects correspond to the estimated coefficients in the case of two-step decision model. For the simultaneous model, the marginal effects are calculated by averaging the individual marginal effect for each option.

Table 2. Marginal Effects of Participation Determinants

	Two-Step Decision Model						Simultaneous Decision Model	
	1		2		3		4	
	PSE	University	PSE	University	PSE	University	College vs Work	University vs Work
Tuition (in $100)	-0.009	0.002	0.0005	0.002	0.002	-0.002	-0.0008	-0.001
	(-3.11)**	(1.31)	(0.17)	(1.62)	(0.20)	(-0.54)	(-0.43)	(-0.43)
Lives in non-Metropolitan Area	0.006	-0.038	-0.011	-0.043	-0.019	-0.059	0.022	-0.037
	(0.35)	(-1.75)	(-0.66)	(-2.04)*	(-1.13)	(-2.43)*	(1.79)	(-2.25)*
Family Earnings (default: 1st quintile)								
Second Quintile ($32,600 - $44,300)	-0.003	0.012	-0.011	0.017	0.006	0.016	-0.006	0.011
	(-0.11)	(0.35)	(-0.47)	(0.52)	(0.26)	(0.50)	(-0.05)	(0.11)
Third Quintile ($44,300 - $57,700)	-0.019	0.021	-0.030	0.017	-0.011	0.029	-0.016	0.001
	(-0.68)	(0.59)	(-1.15)	(0.52)	(-0.43)	(0.85)	(-0.13)	(0.01)
Fourth Quintile ($57,700 - $74,800)	-0.003	0.026	-0.008	0.024	0.034	0.043	-0.011	0.046
	(-0.10)	(0.67)	(-0.31)	(0.68)	(1.32)	(1.22)	(-0.09)	(0.44)
Fifth Quintile ($74,800 - $243,700)	0.018	0.034	0.011	0.032	0.052	0.050	-0.012	0.065
	(0.56)	(0.93)	(0.36)	(0.94)	(1.75)	(1.49)	(-0.10)	(0.61)
Parental Education (default: less than PSE)								
Mother is College Educated	0.119	0.033	0.088	0.017	0.077	0.022	0.016	0.058
	(4.83)**	(1.26)	(3.93)**	(0.63)	(3.62)**	(0.84)	(1.26)	(3.03)**
" " University Educated	0.199	0.049	0.148	0.030	0.130	0.028	0.027	0.097
	(7.86)**	(1.79)	(6.40)**	(1.15)	(5.64)**	(1.10)	(1.69)	(4.61)**
Father is College Educated	0.068	-0.009	0.047	-0.010	0.043	-0.010	0.021	0.023
	(3.11)**	(-0.29)	(2.18)*	(-0.34)	(2.09)*	(-0.36)	(1.51)	(1.18)
" " University educated	0.158	0.086	0.103	0.061	0.081	0.059	-0.006	0.085
	(6.17)**	(3.43)**	(4.20)**	(2.50)**	(3.33)**	(2.51)*	(-0.44)	(3.81)**
High School GPA (default: 70% to 79%)								
69% or less			-0.199	-0.116	-0.138	-0.078	-0.044	-0.121
			(-9.97)**	(-2.09)*	(-7.16)**	(-1.51)	(-2.94)**	(-5.72)**
80% to 89%			0.208	0.180	0.172	0.163	-0.033	0.189
			(10.73)**	(6.95)**	(8.99)**	(6.36)**	(-2.47)*	(10.14)**
90% or more			0.352	0.280	0.298	0.255	-0.081	0.365
			(11.69)**	(10.56)**	(9.91)**	(9.31)**	(-4.78)**	(11.46)**
Other Controls					X	X	X	X
% of Predicted Probabilities outside [0, 1]	0.0%	0.0%	0.0%	1.5%	3.0%	4.1%		
Number of observations	7,602	3,574	7,602	3,574	7,602	3,574	7,602	

t-statistics reported in parantheses * significant at 5% ** significant at 1%

Note 1: Quebec and Ontario students are excluded from the analysis. All specifications include dummies to indicate whether family earnings were imputed and to account for single-parent families.

Note 2: Other controls include individual and family characteristics such as the respondent's gender and the proportion of friends intending to pursue a post-secondary education, wage premiums associated with a college and an university diploma, a time trend and provincial dummies.

Note 3: The standard errors are calculated by bootstrapping the marginal effects using the 1,000 survey weight replicas provided in the YITS dataset.

Living in a non-metropolitan area – where the likelihood of there being a university institution is low – does not seem to affect the probability of enrolling in a PSE program. However, it does negatively and significantly reduce the probability of attending a university in the last three specifications. This is consistent with Frenette's finding that rural dwellers make up for lower university participation by going to college in greater proportions (Frenette, 2003). As more controls are added to the regressions, the effect also becomes stronger and more significant (specifications 3 and 4). The negative effect of non-metropolitan area may capture the additional cost incurred when one has to move to attend university. It could also reflect the lower earnings expectation associated with a university degree in non-metropolitan areas, which our measure of wage premium may not account for adequately.

All three specifications of the two-step decision model suggest that family earnings influence neither the probability of enrolling in a PSE program nor the choice of programs. This could merely be an artefact of the model's structure. Indeed, if Figure 6 portrays the situation accurately, college participation is invariant to family earnings and university participation rises with tuition in the upper family earnings quintiles. Given that the first step of the two-step model lumps college and university participation together, the effect of family earnings might be obscured. Moreover, the second step is estimated in a reduced sample composed of only PSE pursuers who might intrinsically be less sensitive to family earnings. The simultaneous decision framework imposes no such restrictions on the data. Nevertheless, family earnings are no more significant in this model than they were in the two-step specifications. Thus, the 15-percentage-point difference in university participation observed in the Figure 6 between the first and the last quintiles vanishes once other individual, familial and labour market characteristics are controlled for.

A higher level of parental education contributes to raising the probability of pursuing at the PSE level (specification 1-3, column "PSE"). Children of university-educated parents are more likely to go to PSE than those of college-educated parents. Although it appears that a mother's education matters more than that of a father's, the difference is not statistically significant. In terms of choosing between college and university in the two-step decision model, the likelihood of opting for a university over a college program rises only if a father holds a university degree. The simultaneous framework reveals parental education only influences the type of PSE program attended rather than the decision to attend as would suggest the two-step decision model.

According to the two-step model, the single most influential factor in deciding to pursue at the PSE level and the program to attend is the high school GPA. This echoes observations made earlier on the basis of the descriptive statistics. Having a GPA in the 80s instead of in the 70s increases the probability of enrolling in a PSE program by 17 percentage points. This effect is roughly 30% larger than the effect of having a university-educated mother and double that of having a university-educated father (Specification 3). Among the pursuers (specification 3, "University" column), better grades entice students to opt for university over college.

Once again, the simultaneous decision framework offers a different perspective. Having a below-average GPA reduces the probability of attending a college or university by 4 and 12 percentage points respectively. Whether this is so because individuals with lower

marks did not enrol in a PSE program (low marks reflecting a lack of motivation to pursue beyond high school) or because the institutions to which they applied turned them down is, unfortunately, impossible to determine. With an above-average GPA, however, individuals are significantly less likely to attend a college program and more likely to go to university.

Results presented in Table 2 suggest that, on average, PSE choices do not appear particularly sensitive to either the direct cost of PSE programs (tuition fees) or to family income (earnings) conditions.

Results for potentially more price-sensitive groups

Previous specifications do not allow for the possibility of differentiated effects of tuition fees across family earnings groups or by level of "demonstrated scholastic ability" (as proxied by the GPA). It is, however, possible that tuition fees constitute a more significant barrier to PSE participation among lower-income groups. Likewise, costs might be a more significant deterrent for individuals of average ability or with lower academic aspirations.[18]

To allow for such possibilities, new regressions are conducted separately by earnings quintiles and GPA groups with the full set of regressors. In Table 3, we report marginal effects within the first and the second quintiles, for those with GPAs of 70-79% and 80-89% and for the intersection of these two sets (i.e. first and second quintiles individuals with GPAs of 70 to 89%).

Along the family earnings dimension (the first four columns), none of the measures of cost– be they tuition or "relocation" costs - seem to matter for participation in PSE or for choosing between college and university. It is surprising to find that living in a non-metropolitan area is not a significant determinant of the choice of programs within the first and second family earnings quintiles.

First and second family earnings quintile students respond somewhat differently to their parents' education. Results for the first quintile suggest that the mother's university education has a positive influence on the pursuit of PSE and the father's college education diminishes the likelihood of pursuing. On the other hand, for the second quintile, both mother's and father's education have a positive influence on PSE pursuit and only university education matters for the choice of program. These findings are similar to the ones found for the whole sample (see in Table 2).

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[18] Students with lower grades, i.e. less than 70%, are unlikely to be accepted by most universities and thus their PSE options are more limited. On the other hand, students with a GPA of 90% or more are more likely to be offered entrance scholarships by PSE institutions making cost less of an issue for them.

Table 3. Effect of Tuition for Potentially Responsive Groups

	By Family Earnings				By Grade Point Average				Intersection of family earnings and GPA[1]	
	Quintile 1		Quintile 2		GPA: 70-79%		GPA: 80-89%			
	PSE	University	PSE	University	PSE	University	PSE	University	PSE	University
Tuition (in $100)	0.001	-0.010	0.008	0.007	0.004	-0.008	0.010	0.003	0.015	0.002
	(0.04)	(-1.04)	(0.52)	(0.57)	(0.28)	(-0.95)	(0.74)	(0.37)	(1.17)	(0.19)
Lives in non-Metropolitan Area	-0.028	-0.070	-0.005	-0.076	-0.004	0.023	-0.054	-0.113	-0.014	-0.113
	(-0.84)	(-1.29)	(-0.14)	(-1.38)	(-0.16)	(0.53)	(-1.89)	(-3.12)**	(-0.46)	(-2.52)*
Parental Education (default : less than PSE)										
Mother is College Educated	0.027	0.072	0.127	-0.019	0.071	-0.017	0.095	0.024	0.058	0.011
	(0.64)	(1.30)	(3.23)**	(-0.34)	(2.17)*	(-0.34)	(2.57)**	(0.65)	(1.49)	(0.23)
" " University Educated	0.124	0.069	0.182	0.119	0.117	0.000	0.124	0.049	0.116	0.088
	(2.31)*	(1.03)	(3.84)**	(2.24)*	(3.42)**	(-0.00)	(2.86)**	(1.38)	(2.60)**	(2.02)*
Father is College Educated	-0.083	-0.010	0.028	-0.026	0.046	-0.039	-0.010	0.020	-0.025	-0.014
	(-1.73)	(-0.14)	(0.72)	(-0.48)	(1.44)	(-0.77)	(-0.26)	(0.52)	(-0.66)	(-0.30)
" " University educated	0.031	0.166	0.139	0.091	0.122	0.177	0.039	0.022	0.127	0.133
	(0.54)	(2.68)**	(3.18)**	(1.88)	(3.45)**	(3.44)**	(0.87)	(0.67)	(2.74)**	(3.16)**
High School GPA (default : 70% to 79%)										
69% or less	-0.174	-0.065	-0.171	-0.149						
	(-5.20)**	(-0.64)	(-4.48)**	(-1.59)						
80% to 89%	0.152	0.204	0.101	0.131					0.127	0.171
	(4.02)**	(4.01)**	(2.59)**	(2.55)*					(4.51)**	(4.37)**
90% or more	0.346	0.230	0.189	0.239						
	(5.96)**	(3.21)**	(3.75)**	(4.69)**						
Family Earnings (default: 1st quintile)										
Second Quintile ($32,600 - $44,300)					0.030	0.083	0.004	-0.015	0.015	0.005
					(0.81)	(1.26)	(0.07)	(-0.30)	(0.54)	(0.14)
Third Quintile ($44,300 - $57,700)					-0.022	0.104	0.017	0.013		
					(-0.55)	(1.44)	(0.35)	(0.29)		
Fourth Quintile ($57,700 - $74,800)					-0.006	0.068	0.073	0.021		
					(-0.13)	(0.89)	(1.57)	(0.46)		
Fifth Quintile ($74,800 - $243,700)					0.013	0.023	0.140	0.042		
					(0.27)	(0.30)	(2.58)**	(0.84)		
% of Predicted Probabilities outside [0, 1]	5.3%	4.3%	3.9%	9.9%	0.9%	0.0%	0.7%	4.5%	0.5%	3.6%
Number of Observations	1,761	715	1,905	860	3,106	1,227	2,507	1,540	2,696	1,235

t-statistics reported in parantheses. * significant at 5% ** significant at 1%

[1] Sample consists of students with a GPA between 70 and 89% and who come from the first or second quintiles of family earnings

Note 1: Quebec and Ontario students are excluded from the analysis. Specifications include the full set of controls. See Appendix B for the full list.

Note 2: The standard errors are calculated by bootstrapping the marginal effects using the 1,000 survey weight replicas provided in the YITS dataset.

When the sample is split according to grades rather than earnings (the four middle columns of Table 3 under the heading "By Grade Point Average"), tuition does not matter for PSE participation of students with GPAs in the 70s or in the 80s. PSE pursuers with higher grades (GPA in the 80-89% range) are deterred from university if they live outside a metropolitan area. In both groups, maternal education plays a substantial role for the PSE decision and none in terms of the university decision. Paternal education, on the other hand, is important for lower-grade students for both decisions but has no impact on the decisions of higher-grade students. Interestingly, students with good grades (GPA in the 80s) from higher-earnings backgrounds (the fifth quintile) are significantly more likely to pursue PSE studies than their lower-earnings counterparts, including the second and third quintiles (F-test statistics of 8.16 and 5.79 respectively). Indeed, with a coefficient of 0.14 in the PSE regression, the fifth quintile is the only earnings indicator that is significant in the regression. This result can either be interpreted as indicating that students from three bottom quintiles are financially constrained or that those of the top quintile have much stronger preferences for a PSE diploma. If financial constraints were driving this result, higher family earnings should be associated with an increased probability of choosing university over college, as the former remains the costlier option. Given that such a relationship is not found, the higher-preferences explanation appears more plausible.

While we found no effect of fees for lower-earnings students or for those with average grades, it is still possible that individuals who combine these two characteristics are more sensitive to tuition fees. The last two columns of Table 3 reveal that they do not differ much in their response to tuition fees from the whole population or other sub-groups analyzed above. Indeed, tuition fees are not instrumental to their decision.[19] Only the relocation costs associated with living in a non-metropolitan area matter for the program choice. Having a parent with a university diploma strongly encourages PSE studies and in particular university attendance, whether it is the father or the mother holding the diploma.

To recapitulate, the probabilities of enrolling in a PSE program and of choosing to attend university over college appear to be insensitive to tuition fees at their measured levels. This result holds regardless of the modeling framework used (two-step or simultaneous), and of the group analyzed (all high school graduates or potentially more price-sensitive groups). Living in a non-Census Metropolitan Area reduces the likelihood of attending university. Finally, the most important predictors of PSE participation – whether at the college or at the university level – are first grades and then parental education.

VII. Discussion and conclusions

College and university tuition fees have increased substantially in the late 1990s in most provinces. The aim of this paper was to determine whether higher tuition fees reduced the incidence of direct transitions from high school to post-secondary studies (PSE) or

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[19] Estimation was also performed for the students with a GPA of 69% or less. An additional regression was conducted for students with grades below 79% and from families pertaining to the first or second family earnings quintiles. In either case, tuition fees do not appear to influence PSE decisions.

diverted students away from university to less costly college programs. Of particular concern was the response of two potentially more price-sensitive groups: students from lower-income families and those with lower measured academic ability. The analysis reveals that current college and university tuition levels do not appear to have had a negative impact on direct transitions from high school to PSE. The result holds regardless of the specification chosen and of the empirical strategy used. More importantly, it extends to students from low-income families and to the ones with moderate measured academic ability. Furthermore, there is no indication that students have opted in significant numbers for college over university because of tuition considerations. These results might seem surprising especially given our treatment of PSE delayers as non-goers. This would indeed tend to increase the impact of fees by allowing for the possibility that higher tuition fees force some individuals to delay entry and work until they can finance the cost of their PSE studies.

Access to funding through government student loans might, in part, explain why we find no evidence of PSE-enrolment responses to the higher tuition fees. As the amounts provided within these programs are means-tested and a function of tuition fees, it is possible that tuition increases were offset by higher loans particularly among children of lower-earnings families. Unfortunately, the information provided in the YITS dataset with respect to student loans is inadequate to verify this hypothesis. An alternate or complementary explanation may relate to the increase in the wage gap between post-secondary and high school graduates that occurred in the late 1990s. This might indeed have raised expected returns to PSE sufficiently to offset higher tuition.[20]

Family earnings in our study have no influence on PSE participation. This finding comes in contrast with that reported by Christofides et al (2001). Recall, however, that their analysis is not restricted to high school graduates whereas ours is. Carneiro and Heckman (2002) and Keane and Wolpin (2001) may offer an explanation as to why these two empirical strategies produce different conclusions with respect to parental income. They argue that higher-income parents have stronger preferences and aptitudes for education, which they transmit to their children. Those parents also tend to invest more and better resources in the development of their children's scholastic abilities from the youngest age. According to this view, the post-secondary enrolment gap between high- and low-income youths originates more from differences in academic ability – the cumulative product of past parental investment – than from differences in access to parental funds at the time of enrolment. This is because low-income youth have not benefited from as much investment in the development of their academic potential, and therefore are less likely to graduate from high school and to attend PSE, irrespective of the level of tuition fees. By including high school dropouts in their analysis, Christofides et al's estimates on parental income most likely capture differences in lifelong investment by families in their children's education rather than variation in family resources at the time of enrolment in PSE. By contrast, having restricted our analysis to high school graduates, our income and tuition results reflect more the impact of parental income at the time of enrolment

[20] Boudarbat et al (2003) find that the wage differential between PSE and high school graduates increased substantially between 1995 and 2000. Our wage premium variable cannot capture this effect as it is measured only at one point in time.

decisions. Therefore, although these two sets of results appear to be contradictory, in fact they offer a complementary insight into the effect of family resources at different points in time. This line of reasoning would suggest that the most effective way of raising PSE participation is to invest in early education. Developing the academic skills of young children could help lift the principal barrier to PSE access and thereby reduce the university participation gap across the income distribution.

Finally, as a note of caution to readers, inference can be drawn from this analysis only within the range of tuition observed in the sample and for provinces other than Quebec and Ontario. Additional research is needed to determine whether our findings hold for more recent years and with more variation in tuition and family income measures,[21] and to assess the price-responsiveness of students in Quebec and Ontario.

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[21] It is important to note that our findings with respect to tuition and parental income effects might to some extent reflect the empirical limitations of our analysis. In particular, since our measures of tuition and income are derived from averages they might not vary sufficiently to precisely estimate their relationship to enrolment. Furthermore, using earnings as a proxy for income abstracts from other possible sources of funds available to families such as income from government transfers. This might lead to an inaccurate representation of the resources available to youth.

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Appendix A College and University Tuition Fees and Relative Cost of University to College 1995-96 to 2000-01, Constant 2000 Dollars

	University Tuition, Weighted Provincial Average					
	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Newfoundland	2,508	2,886	3,361	3,360	3,472	3,373
Prince Edward Island	3,078	3,132	3,317	3,507	3,644	3,499
Nova Scotia	3,572	3,891	4,114	4,279	4,182	4,511
New Brunswick	2,753	2,982	3,165	3,348	3,438	3,581
Quebec	1,850	1,824	1,909	1,881	1,866	1,827
Ontario	2,766	3,228	3,488	3,825	4,212	4,263
Manitoba	2,765	2,919	3,080	3,277	3,552	3,193
Saskatchewan	2,922	2,915	3,231	3,393	3,430	3,639
Alberta	3,071	3,260	3,480	3,738	3,859	3,909
British Columbia	2,676	2,682	2,658	2,628	2,675	2,657

	College Tuition, Provincial Average					
	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Newfoundland	922	1,123	1,261	1,390	1,410	1,452
Prince Edward Island	1,387	1,883	1,906	1,897	1,921	2,000
Nova Scotia	727	925	944	1,093	1,449	1,750
New Brunswick	736	1,123	1,529	1,924	2,347	2,400
Quebec	0	0	0	0	0	0
Ontario	1,013	1,182	1,325	1,471	1,636	1,718
Manitoba	823	970	1,157	1,265	1,400	1,292
Saskatchewan	1,270	1,478	1,632	1,806	2,002	1,882
Alberta	1,021	1,231	1,556	1,813	2,057	2,339
British Columbia	1,276	1,288	1,298	1,301	1,315	1,340

	University Tuition as a Proportion of College Tuition (Relative Cost)					
	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01
Newfoundland	2.7	2.6	2.7	2.4	2.5	2.3
Prince Edward Island	2.2	1.7	1.7	1.8	1.9	1.7
Nova Scotia	4.9	4.2	4.4	3.9	2.9	2.6
New Brunswick	3.7	2.7	2.1	1.7	1.5	1.5
Quebec	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ontario	2.7	2.7	2.6	2.6	2.6	2.5
Manitoba	3.4	3.0	2.7	2.6	2.5	2.5
Saskatchewan	2.3	2.0	2.0	1.9	1.7	1.9
Alberta	3.0	2.6	2.2	2.1	1.9	1.7
British Columbia	2.1	2.1	2.0	2.0	2.0	2.0

Appendix B Coefficients for the Full Specification

	Two Steps Decision		Simultaneous Decision	
	PSE	University	College	University
Costs and Net Benefits				
Tuition (in $100)	0.002	-0.002	-0.008	
	(0.20)	(-0.54)	(-0.43)	
Lives in an urban area	0.019	0.059	-0.149	0.185
	(1.13)	(2.43)*	(-1.14)	(1.81)
Premium (in $100)			-0.0004	
			(-0.32)	
Premium for College Education (in $100)	-0.001	0.00002		
	(-1.49)	(0.03)		
Premium for University Education (in $100)	0.0001	0.0001		
	(0.63)	(0.36)		
Family Background				
Family Earnings (default : 1st quintile)				
Second Quintile ($32,600 - $44,300)	0.006	0.016	-0.037	0.061
	(0.26)	(0.50)	(-0.22)	(0.43)
Third Quintile ($44,300 - $57,700)	-0.011	0.029	-0.173	-0.033
	(-0.43)	(0.85)	(-0.95)	(-0.21)
Fourth Quintile ($57,700 - $74,800)	0.034	0.043	0.004	0.279
	(1.32)	(1.22)	(0.02)	(1.75)
Fifth Quintile ($74,800 - $243,700)	0.052	0.050	0.032	0.395
	(1.75)	(1.49)	(0.16)	(2.21)*
Imputed Salary for at least one Parent	-0.036	0.026	-0.283	-0.152
	(-2.13)*	(1.20)	(-2.12)*	(-1.53)
Parental Education (default : less than PSE)				
Mother is College Educated	0.077	0.022	0.322	0.412
	(3.62)**	(0.84)	(2.28)*	(3.41)**
" " University Educated	0.130	0.028	0.541	0.691
	(5.64)**	(1.10)	(3.34)**	(5.34)**
Father is College Educated	0.043	-0.010	0.280	0.201
	(2.09)*	(-0.36)	(2.02)*	(1.67)
" " University educated	0.081	0.059	0.153	0.528
	(3.33)**	(2.51)*	(1.02)	(3.82)**
Missing Parental Education [1]	0.025	0.077	-0.140	0.296
	(0.98)	(1.98)*	(-0.67)	(1.87)
Number of Siblings	-0.010	-0.002	-0.042	-0.060
	(-1.95)	(-0.25)	(-1.11)	(-1.67)
Student Characteristics & Preparation				
Male	-0.039	-0.014	0.222	0.225
	(-1.97)*	(-0.58)	(1.95)	(1.88)
First Language not French or English	0.132	0.047	0.463	0.819
	(4.64)**	(1.24)	(2.12)*	(5.02)**
High School GPA (default : 70% to 79%)				
69% or less	-0.138	-0.078	-0.681	-0.998
	(-7.16)**	(-1.51)	(-4.32)**	(-5.59)**
80% to 89%	0.172	0.163	0.115	1.009
	(8.99)**	(6.36)**	(0.87)	(9.83)**
90% or more	0.298	0.255	-0.044	1.842
	(9.91)**	(9.31)**	(-0.15)	(9.60)**
Took University Preparatory Math	0.193	0.286	0.377	1.656
	(10.31)**	(6.63)**	(2.63)**	(10.31)**

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	Two Steps Decision		Simultaneous Decision	
	PSE	University	College	University
Friends' Propensity for PSE (some)				
None	-0.063	-0.005	-0.377	-0.342
	(-3.59)**	(-0.20)	(-2.62)**	(-3.28)**
All	0.055	-0.008	0.374	0.232
	(2.76)**	(-0.37)	(2.86)**	(2.01)*
Trends & Regional Controls				
Year of PSE Entry (default = 1998)				
1997	0.006	0.008	0.001	0.046
	(0.27)	(0.31)	(0.01)	(0.38)
1999	0.065	0.031	0.257	0.449
	(3.06)**	(1.31)	(1.95)	(4.12)**
Regional Controls (default = Alberta)				
Newfoundland	0.039	0.061	-0.107	0.247
	(1.07)	(1.41)	(-0.51)	(1.13)
Prince Edward Island	0.113	0.051	0.422	0.722
	(2.36)*	(0.76)	(1.52)	(2.89)**
Nova Scotia	0.123	0.097	0.373	0.819
	(2.37)*	(2.16)*	(1.65)	(4.84)**
New Brunswick	0.095	0.027	0.332	0.465
	(3.48)**	(0.50)	(1.76)	(2.24)*
Manitoba	0.032	0.095	-0.151	0.236
	(0.76)	(1.98)*	(-0.70)	(1.00)
Saskatchewan	-0.034	0.017	-0.240	-0.077
	(-1.24)	(0.28)	(-1.23)	(-0.35)
British Columbia	-0.066	-0.060	-0.168	-0.586
	(-1.94)	(-0.88)	(-0.89)	(-1.89)
Constant	0.158	0.286	-2.021	-3.014
	(1.22)	(1.84)	(-4.33)**	(-2.91)**
Observations	7602	3574	7,602	
Predicted probability (at means)	47.4%	67.4%		

t-statistics reported in paranthesis. * significant at 5% ** significant at 1%

(1) Missing parental education information was put to a high school diploma which correponds to the mean in the dataset.
Note 1: The standard errors are calculated by bootstrapping the coefficients using the 1,000 survey weight replicas provided in the YITS dataset.